Ectopic Expression of constitutively Activated Small GTPase Cdc42 Alters the Morphology of Haploid and Dikaryotic Hyphae in the Filamentous Homobasidiomycete *Schizophyllum commune*

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Cloning of the *Cdc42* gene from *Schizophyllum commune* enabled investigation of the role of *ScCdc42* in the regulation of vegetative growth and sexual reproduction in this fungus, which has a well-characterized hyphal cell structure, cytoskeleton and mating system. Ectopic expression of the constitutively active *Sccdc42*^{G12V} or *Sccdc42*^{Q61L} allele from native or inducible *ScCel1* promoters had dramatic effects on hyphal morphology, cytoskeletal structure and Cdc42 localization, while ectopic over-expression of the wt or the dominant negative *ScCdc42*^{D118A} allele had no detectable effect. For transformants with constitutively active *Sccdc42* tip growth of apical cells in the leading hyphae was normal but polar tip growth in side branches was altered implying different regulation of polarity establishment in the two groups of apical cells.

The *S. commune* genome also contains a gene encoding RacGTPase. Rac1 might regulate the polarized growth of leading hyphae while ScCdc42 regulates the development of side branches in *S. commune*. In transformants with constitutively active *Sccdc42* branch emergence at exceptional sites and isotropic growth next to the septum proved that the branch site selection and subsequent hyphal development are under ScCdc42 control. Poor dikaryotization along with irregular clamp connections in mates with *Sccdc42*^{G12V} or *Sccdc42*^{Q61L} allele suggested that Cdc42 also contributes to efficient mating in *S. commune*. Our results provide strong evidence that Cdc42 is involved in the control of hyphal morphogenesis in filamentous homobasidiomycetes.

Genetics and Cellular Biology of Basidiomycetes-VI. A.G. Pisabarro and L. Ramírez (eds.)
 ISBN 84-9769-107-5